Machine Learning a Practical Approach

Module 1: Fundamentals of Machine Learning - Intro to SciKit Learn

This module introduces basic machine learning concepts, tasks, and workflow using an example classification problem based on the K-nearest neighbors method, and implemented using the scikit-learn library.

1. Introduction
2. Key Concepts in Machine Learning
3. Python Tools for Machine Learning
4. Notice for Auditing Learners: Assignment Submission
5. An Example Machine Learning Problem
6. Examining the Data
7. K-Nearest Neighbors Classification
8. Zachary Lipton: The Foundations of Algorithmic Bias
9. Assignment 1

Module 2: Supervised Machine Learning - Part 1

This module delves into a wider variety of supervised learning methods for both classification and regression, learning about the connection between model complexity and generalization performance, the importance of proper feature scaling, and how to control model complexity by applying techniques like regularization to avoid overfitting. In addition to k-nearest neighbors, this week covers linear regression (least-squares, ridge, lasso, and polynomial regression), logistic regression, support vector machines, the use of cross-validation for model evaluation, and decision trees.

1. Introduction to Supervised Machine Learning
2. Overfitting and Underfitting
3. Supervised Learning: Datasets
4. K-Nearest Neighbors: Classification and Regression
5. Linear Regression: Least-Squares
6. Linear Regression: Ridge, Lasso, and Polynomial Regression
7. Logistic Regression
8. Linear Classifiers: Support Vector Machines
9. Multi-Class Classification
10. Kernelized Support Vector Machines
11. Cross-Validation
12. Decision Trees
13. A Few Useful Things to Know about Machine Learning
14. Classifier Visualization Playspace

15. Assignment 2

Module 3: Evaluation

This module covers evaluation and model selection methods that you can use to help understand and optimize the performance of your machine learning models.

1. Model Evaluation & Selection
2. Confusion Matrices & Basic Evaluation Metrics
3. Classifier Decision Functions
4. Precision-recall and ROC curves
5. Multi-Class Evaluation
6. Regression Evaluation
7. Practical Guide to Controlled Experiments on the Web
8. Model Selection: Optimizing Classifiers for Different Evaluation Metrics
9. Assignment 3

Module 4: Supervised Machine Learning - Part 2

This module covers more advanced supervised learning methods that include ensembles of trees (random forests, gradient boosted trees), and neural networks (with an optional summary on deep learning). You will also learn about the critical problem of data leakage in machine learning and how to detect and avoid it.

1. Naive Bayes Classifiers
2. Random Forests
3. Gradient Boosted Decision Trees
4. Neural Networks
5. Neural Networks Made Easy
6. Play with Neural Networks: TensorFlow Playground
7. Deep Learning
8. Deep Learning in a Nutshell: Core Concepts
9. Assisting Pathologists in Detecting Cancer with Deep Learning
10. Data Leakage
11. The Treachery of Leakage
12. Leakage in Data Mining: Formulation, Detection, and Avoidance
13. Data Leakage Example
14. Rules of Machine Learning: Best Practices for ML Engineering
15. Assignment 4
16. Unsupervised Learning Notebook Introduction
17. Dimensionality Reduction and Manifold Learning
18. Clustering
19. How to Use t-SNE Effectively

20. How Machines Make Sense of Big Data: an Introduction to Clustering Algorithms

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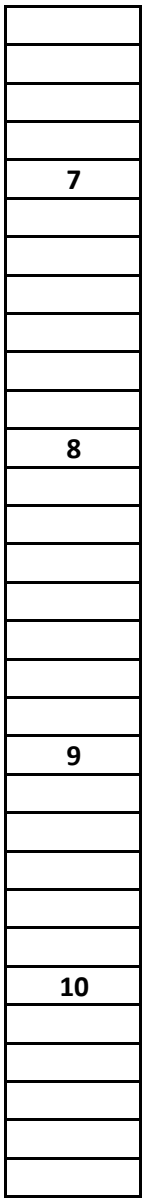
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Amazon webservices System Architect and Solution Architect 40 Hrs.

Course Name
Cloud Computing
1. Introduction to Cloud Computing
2. Introduction to Amazon Webservices – Services Overview and AWS Infrastructure overview
3. Preparatory Topics – Virtualization, Networking and Storage concepts
4. AWS Management Console and AWS Account
Amazon Services
1. Amazon EC2 – Instance types, families, generations
2. Amazon EBS – Magnetic, SSD, Provisioned IOPS
3. Amazon VPC – Subnets, ACLs, Routing rules, Security Groups
4. Hands-on activity: Creating a VPC, Creating instances (VMs) on EC2 and configuring all necessary services, attaching EBS volumes, Elastic IPs, etc.
Storage
1. Storage– Object Storage, file shares and their use cases
2. Amazon S3, Glacier, (File Share Service), CloudFront
3. Amazon Cloudwatch – Monitoring service
4. Hands-on activity: Creating S3 buckets, putting and getting objects from S3, hosting a static website on S3
Amazon Web Services Activity
1. Amazon ELB
2. Amazon Auto-scaling – Launch Configurations, Auto-scaling Policies
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AWS Database services
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AWS Infrastructure (Templates)
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3. Fundamentals of Cloudformation templates
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4. Cost Estimation using Simple Monthly Calculator
5. Hands-on Activity – configuring Simple Email Service (SES)
Big Data and Hadoop,Pig and Hive
1. Big Data and Hadoop,Pig and Hive
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3. Q&A session for all previously covered topics, preparation tips for AWS SA-Associate Level Certification exam
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1. Deploying a 3-tier web-application using AWS services
2. Brief introduction to Vagrant and Chef
3. Automated deployment of Test/Dev environments using Vagrant, Chef and AWS


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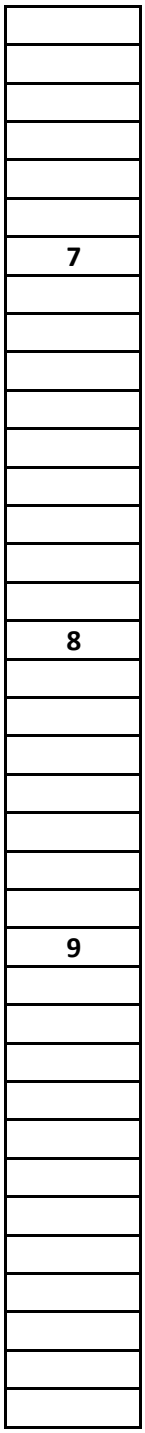
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AWS Developer DevOps

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CloudFormation
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Elastic Beanstalk
Using Elastic Beanstalk
Virtual Private Cloud (VPC)
Building our own custom VPC
Network Address Translation (NAT)
Access Control Lists (ACLs)
Custom VPC’s and ELBs
NAT’s vs Bastions


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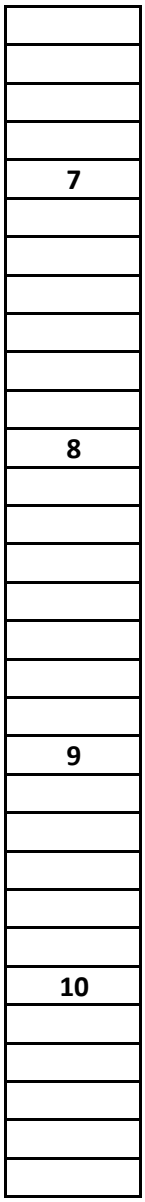
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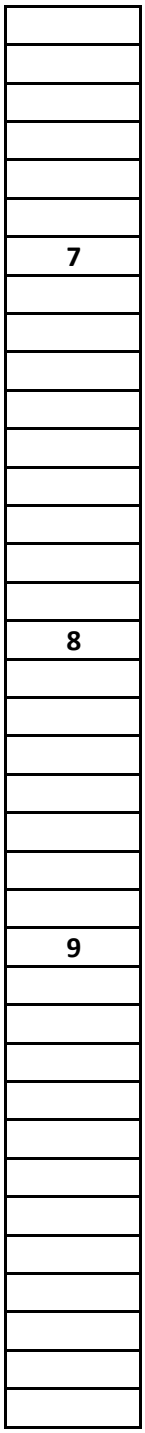
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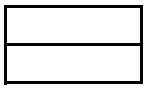

15 Days handson workshop on Data Scientist

Topics	Duration
Cloud Computing	
What is Cloud Computing?	**Day 1**
Why Cloud Computing?	
Characteristics of Cloud Computing	
Cloud Computing – Technologies	
Cloud Deployment Model - Public Cloud, Private Cloud, Hybrid Cloud	
Cloud Service Model - IAAS, PAAS, SAAS	
Cloud Services – Users	
Cloud Virtualization	
Cloud - UseCase	
Big Data Analytics	
Understanding Big Data and Hadoop	**Day 2**
Hadoop Architecture and HDFS	
Hadoop MapReduce Framework	
Processing the distributed data with Apache spark	
Data Science With SAS	
Introduction to Data Science	**Day 3**
Working with SAS	
Navigating in the SAS Console	
SAS Language Input Files	
DATA Step	
PROC Step and DATA Step	
DATA Step Processing	
SAS Libraries	
Topics	**Duration**
Combining and Modifying Datasets	
Why Combine or Modify Data	**Day 4**
Concatenating Datasets	
Interleaving Method	
One - to - one Reading and Merging	
Data Manipulation	
Modifying Variable Attributes	
PROC SQL	
SAS Macros	
Data Statestics	
Introduction to Analytics and data statistics	

Basics of Statistics	**Day 5**
Procedures in SAS for Descriptive Statistics	
Parametric and Non - parametric Tests	
Data Exploration and Advanced Statistics	
Working with time series Data	
Designing Otimization Model	
R Programming	
Introduction to R programming	**Day 6**
Operators in R	
Conditional statements in R	
Running a R and Batch script	
Functions in R	
Data Processing with R Part 1	
R Data Structure	**Day 7**
Vectors	
Colon Operator	
Accessing Vector Element	
Accessing Matrix Element	
Accessing Array Element	
Data Processing with R Part 2	
Creating a Data frame	**Day 8**
Create a factor	
Create a List	
Importing files in R - Minitab,Table,CSV	
Topics	**Duration**
Functions and Data Visualization	
Apply(),Lapply(),Tapply(),Vapply(),Dplyr()	**Day 9**
Types of Grahics	
Creating a Bar chart,Pie chart,Histogram	
Creating a kernel Density plot	
Line chart and Box Plots	
Heat map and word clouds	
Rstudio	
Business Analytics With Excel Part 1	
Conditional Formatting	**Day 10**
Lookup and referance	
Vlookup, Hlookup, Match Function	
Index and Offset Function	
Business Analytics With Excel Part 2	

Statistical Functions	**Day 11**
SUMIFS , COUNTIFS	
PERCENTILE and QUARTILE	
STDEV, MEDIAN and RANK Function	
Analyzing Data with Pivot Tables	
Custom Calculation	**Day 12**
Calculated Field and Calculated Item	
Calculated Field Example	
Calculated Item Example	
Slicer Intro	
Creating a Slicer	
Grouping in Pivot Table	
Principles of Great Dashboard Design	
Pareto Chart, Chart Formatting and Thermometer Chart	
Business Analytics With Excel	
Solver Add in	**Day 13**
Goal Seek	
Scenario Manager	
Data Table	
Descriptive Statistics	
Data Analysis Using Statistics	
Power BI	
Topics	**Duration**
Apache Kafka Part 1	
Introduction to Apache Kafka	**Day 14**
working with ZooKeeper	
Working with Distrubuted Application	
Deadlocks and Inconsistencies	
ZooKeeper Characteristics and Data Model	
Working with Znodes	
ZooKeeper Installation	
ZooKeeper Configuration	
working with ZooKeeper Command Line Interface and commands	
ZooKeeper Client APIs	
ZooKeeper Recipe 1: Handling Partial Failures	
ZooKeeper Recipe 2: Leader Election	
Aggregating User Activity Using Kafka	
Apache Kafka Part 2	
Kafka Multi Node cluster	**Day 15**
Creating and Sending messages	
Kafka Multi Node cluster Setup	
5.14 Java Interface to Kafka	
5.15 Producer Side API	

5.21 Consumer Side API

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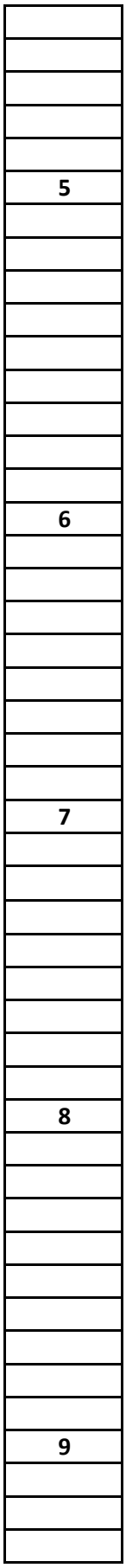
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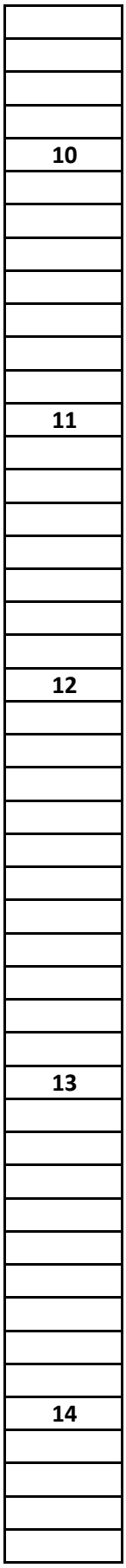
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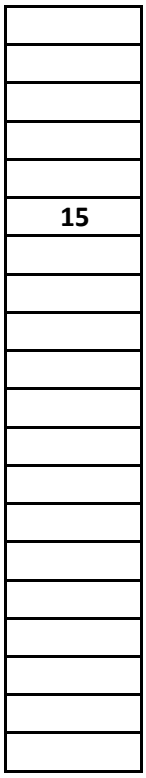
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Blockchain Session Breakup

Topics
Cryptocurrency & Blockchain
• Transformation in trading units
• Cryptography and Crypto-currency
• Anonymity and Pseudonymity in cryptocurrencies
• Digital Signatures
• Cryptocurrency Hash codes
• Distributed networks
Delving into Blockchain
• Why Blockchain is crucial?
• Key vocabulary while discussing Blockchain
• Distinction between databases and blockchain
• Explaining Distributed Ledger
• Blockchain ecosystem
• Blockchain structure
• Working of blockchain technology
• Permissioned and permission-less blockchain
Bitcoin and Blockchain Part 1
• Bitcoin and its History
• Why use bitcoins?
• Where and how to buy bitcoins
• How to store bitcoins?
• How and where to spend bitcoins?
• Selling bitcoins
• Bitcoin transactions
• How bitcoin transactions work
• Distributed Ledger – Concepts
Bitcoin and Blockchain Part 2
• What happens in case of invalid transactions
• Parameters that invalidate the transactions
• Scripting language in bitcoin
• Applications of bitcoin script
• Nodes and network of bitcoin

• Various roles you can play in bitcoin ecosystem
• Setting up bitcoin wallet
• Creating a paper wallet
• Transaction tracking of bitcoin
Bitcoin Mining Part 1
• Deduce the purpose of mining
• How bitcoin mining works?
• Comprehend bitcoin mining
• Perceive the importance of mining pools
• Infer bitcoin security
• Algorithm used in mining
• Installing and configuring bitcoin mining software
Bitcoin Mining Part 2
• Mining hardware
• Bitcoin mining pools
• How cloud mining of bitcoin works?
• Mining Incentives
• Security and Centralizations
• Mining Bitcoins on our PC
Ethereum Part 1
• Apprehend another blockchain platform: Ethereum
• Perceive the Ethereum Ecosystem
• Understand how mining works in Ethereum
• Solidity programming language
• The Ethereum ecosystem, DApps and DAOs
• Ethereum Architecture
Ethereum Part 2
• Learning Solidity
· Contract classes, Functions and conditionals
· Inheritance & abstract contracts
· Libraries
· Types & Optimization
· Global Variables
· Debugging
Setting up Private Blockchain Environment using Ethereum Platform
• The steps required to build a blockchain solution
• Setup your private blockchain environment

• Analyse the blockchain environment.
• Develop smart contract on Ethereum
• Deploy the contract on Web and console
Private and public blockchain Part 1
• Various blockchain setup platforms
• Using Ethereum to setup private blockchain
• Steps to build a blockchain solution
• Creating Smart contract on Ethereum
• Compile, deploy and instantiate contracts
Private and public blockchain Part 2
• Configuring, running and working with the go-Ethereum client
• Account management and mining
• Understand the different stages of a contract deployment
• How to interact with a contract once deployed?
• Implementing Blockchain using Ethereum
Private and public blockchain Part 3
• Installing Ethereum software
• Setting up servers
• Creating blockchain environment
• Mining of Ether
• Sending of Ether
• Tracking information using hash
• Viewing Information about blocks in blockchain
• Developing smart contract on private blockchain
• Deploying contract from web and console
Hyperledger
• Hyperledger architecture, Membership , Chaincode
• Consensus & its interaction with architectural layers
• Application programming interface
• Application model
• Network topology
• Exploring Hyperledger frameworks
• Hyperledger Fabric , Indy, Iroha
Setting up development environment using Hyperledger Composer
• Setting up development environment using Composer
• Developing business networks
• Testing business networks

• Introduction to Hyperledger Fabric
• Hyperledger Fabric Model
• Various ways to create Hyperledger Fabric Blockchain network
• Deploying & testing business networks
Create & deploy your private Blockchain on MultiChain
• What is MultiChain
• Privacy & Permissions in MultiChain
• Mining in MultiChain
• Multiple configurable blockchains using MultiChain
• Setting up a private blockchain
• Creating a blockchain
• Connecting to a blockchain
• Some commands in interactive mode
• Using native assets
• Transaction metadata
• Streams
• Round robin mining


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